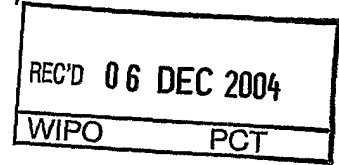# LÝÐVELDIÐ ÍSLAND

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A METHOD AND A SYSTEM FOR TRACING FOOD ITEMS

Introduction

The present invention relates to an apparatus for processing food wherein food items are conveyed through processing stations where they are cut into pieces and
5 optionally mixed with items originating differently. In particular, the invention relates to a system wherein information related to each food item and the positions of the food items throughout the processing are traced so that the origination of a food item is preserved.

Background of the invention

10 In food processing industries, traceability is an important aspect, especially since BSE was diagnosed in Europe. Even though focus mainly has been on meat products, the need for traceability of food products in general is increasing.

Typically, food products are processed, batched and packed in production lines wherein process equipment and workers are placed along conveyer lines. Often, and in
15 particular in meat processing lines, large items, e.g. whole animals or large parts of animals are brought into one end of the process line from which end the items move towards an opposite end while they are sliced into various cuts, trimmed and optionally processed further before the sub-items end in food products, e.g. in a precooked meal or in packages with slices of meat. With regards to contamination and
20 bacterial control, it is desirable to keep items of different origination completely separated. Separation, inevitably, implies time consuming, and costly logistic problems as well as increased loss when residual food items are too small to be used in the final product. It is therefore normal to mix items of various originations during food processing.

25 In existing food processing systems, food products can normally be traced back to a certain production date or period. The traceability primarily relies on batching of production series into food batches, wherein one food batch could represent production of a certain food product within a certain time frame. The food products are normally grouped into batches under consideration of required processes so that a
30 batch e.g. requires trimming and cutting according to certain quality standards or the food products may be grouped based on their final destination, e.g. one batch of food items are to be shipped to a specific country. Due to the relatively rough grouping of the food products into batches, it happens that large amounts of finished products must be called back for destruction, e.g. due to contamination caused by items of one
35 single origination, e.g. one animal carrying BSE, or due to contamination of a single production facility, e.g. contamination of a single circular saw out of many.

Manual registration of entering food items and labelling of the items as they pass through various processes do not solve the problem completely. Not least due to the repeated moving around with tags and the limited abilities of fastening tags to food

items, e.g. under wet or humid conditions, and not least when items of various originations are combined in food products, the origination appearing on a label can be vitiated by errors and due to the degree of uncertainty combined with the seriousness involved in distribution of infected and possible injurious food products, it frequently
5   happens that food producing industries dispose large quantities of food.

Description of the invention

It is an object of a preferred embodiment of the present invention to provide means making tracing of meat simpler and reducing risk of loss in large scale meat processing facilities. Accordingly, the present invention in a first aspect provides a
10   method of operating a combined information handling and food processing system wherein items can be conveyed between processing means while a computer system traces its position and preserves information representing its origination while the food is processed, said method comprising the steps of:

—   storing a data set of a first type representing origination of an item in memory
15   of a computer system,

—   conveying the item to process means for separation of the item into sub-items while the positions of the item and the sub-items are traced by the computer system,

—   selecting sub-items for a batch, and

20   —   assigning data from the data set of the first type representing the origination of the item to the batch.

Due to the storing of data in memory of the computer system, the tracing of the positions of the item and sub-items of the item and the assigning of data representing origination of the item to batches of sub-items, it is possible to trace the origination of
25   items in a batch of items even though the sub-items are mixed from items of different originations. Since the data is preserved in the memory of a computer system rather than on labels, the certainty of the origination of items in a food product is highly improved and the process of moving labels and duplicating labels between items and sub items during the processing is eliminated.

30   The food processing system could be provided with a food item intake wherein the origin of the food item is registered, a number of processing stations wherein the food item is separated by cutting into sub-items and wherein the sub items are weighed on a scale, e.g. in a weighing machine, e.g. on dynamic scales while they are conveyed. Finally, the food items are rejected from the conveyer system into receptacles such as
35   bins wherein batches of food sub-items are formed. The selection of sub-items for batches may be based on a weight criterion for the batches. The food items could be meat, fish, vegetables, fruit and similar items and the separation process of the items

into sub items could be the process of removing bones from meat, slicing food into slices, trimming of fat or removing impurities, peels, husks or shells etc.

In order to preserve the information relating to the origination of the items in a database rather than having to affix the information physically to the batches before
5 they leave the system, a data set of a second type which comprises data from the data set of the first type representing the origination of at least one item and an identifier identifying the batches may be formed.

Large quantities of food products may have to be disposed when food items originating from different locations are mixed in the batches, and for the reason of
10 uncertainty, food producing industries can charge more money for food products containing food of only one single or a few originations. Accordingly, the method may comprise forming of batches of a first type from sub-items of items of a single origination. Residual amount of sub-items from one origination which is insufficient for filling one batch may be used for batching a second type of batches with a mixed
15 content. In fact, the same system may be used for batching the batches of the first type and batches of the second type simultaneously as food items are conveyed through the system.

A decision on disposal of a food product or the evaluation of the quality of the food product can be based on knowledge about the processing of the food product. As an
20 example, the risk of spreading BSE from the spinal marrow depends on the method of quartering and cutting up the animal. Moreover, information on the processing of the meat can be used for determining the original condition of the food product prior to the processing. Accordingly, the data set of the second type may include information relating to the processing of an item or sub-item and may further include information
25 identifying a processing resource or facility which has been in contact with the item or sub-item, e.g. a circular saw, a process worker, a part of the conveyor belt etc. This information can be used for tracing food items which have been in contact with infected equipment or which have been processed by a worker carrying an infection.

In a batching process, batches are normally formed under consideration of
30 requirements defined by a contract between a delivering and a receiving part, and most often, minimum weight of the batch is a key issue. Normally, the part of the batch which exceeds the minimum weight is counted by the delivering part as a loss and therefore batching machines normally select items for batches in order to end up with batches exceeding the minimum weight as little as possible. In one embodiment
35 of the present invention, wherein batches of the second type comprises mixed items, it may however be an advantage to select items for batches under a criterion wherein the number of different origins of the sub-items is within a predetermined range, e.g. in order to minimize the number of different origins. In one batching cycle, a first and a second item, e.g. sub items, may be selected for a given batch. By selecting the first
40 item, the overweight of the batch might be lower than by selecting the second item. If, however, the second and not the first item, originates from the same place as other

items of the batch, the second item may be selected for the batch. In one embodiment of the invention, items are selected for batches in accordance with a batching criterion based on the weight of the item, the weight of the batch and the origination of the item versus the originations of the items already in the batch.

5   Subsequent to the batching of the items, the batches may be loaded into packages to which data from the first or second set of data have been assigned. This enables at least one origination of sub-items in that package, or the identity of the package to appear on the label of the package. Alternatively, or in addition thereto, the identity of resources or facilities which have been in contact with sub-items in that package may
10   appear on the label. Particularly for a given item or a processing station performing breakdown of the item into sub-items or an operator assigned to a processing station, it is possible to identify all packages that include sub-items from the given item, or it is possible to identify the packages that were processed at the given processing station or that were handled by the given operator. Furthermore, given a pack with a
15   contaminated sub-item, all packs with sub-items originating from the same item or packs which went through the same process stations or were handled by the same operator as the contaminated sub-item, can be identified.

In a second aspect, the present invention relates to a combined information handling and food processing system comprising:

20   –   a conveyer for conveying a food item to process means for separation of the item into sub-items,

         –   a computer with memory, the computer being adapted to:

             –   store a data set of a first type representing origination of an item in the memory,

25   –   select sub-items for a batch, and

             –   assign data from the data set of the first type representing the origination of the item to the batch.

The system could be adapted to work in accordance with the method described for the first aspect of the invention. In particular, the system could be provided with
30   automatic sensing means such as bar code or RFID-tag readers for registering origination data into the memory of a computer system when food items enters the system. Label printers may print and affix labels with origination data to packages formed by the system, or, the labels may contain identification data for identifying the package. If the origination of the content of one package is requested, the information
35   may be retrieved from a computer database system keeping a record of package ID's of a package and corresponding origination data for its content.

Detailed description of the invention

In the following, a preferred embodiment of the invention will be described in further details with reference to the drawing in which:

Figs. 1 and 2 show systems according to the present invention.

5 . Fig. 1 shows an integrated food processing and information handling system according to the present invention. The system comprises a conveyor comprising a transport belt carrying the items from an item intake 1 towards a batching area 2 comprising discharging arms for shifting the items from the conveyor belt into a collecting bin. In the disclosed situation, three receptacles 3, 4, 5 holding selected sub-items for

10 forming batches or packs have received in total 4 items and a fifth item is about to enter the second bin 4. The arrows 6 indicate the conveying direction of the belt. The system is operated by a person 7 who, in addition to operating the system, may process the items, e.g. by trimming meat items. The system has a computer controlled processing station 8 for separation of items into sub-items. The computer

15 controlled processing station could comprise a computer controlled knife which cuts pieces of meat into smaller pieces. The processing station may be controlled e.g. by information relating to the size, shape, weight, colour, water content, specific gravity etc., and the information may be keyed into the system by the operator, or the information may be determined by sensor systems, e.g. comprising a scale, a camera

20 or an X-ray detector etc. arranged along the conveyor 1.

A host computer 9 is connected to sensors 10 and 11. The sensors collect data sets relevant for the traceability of the meat and forward the data to the host computer. A data set of a first type is stored in the computer system. The data represents the origination of the item entering the system, e.g. from which animal, or from which

25 farm, or from which country a piece of meat originates. The data is generated e.g. when the animal enters a slaughterhouse, at which point the data may be stored in an electronic tags which are attached to pieces of meat from that animal. In the computer controlled processing station 8, the information in the tags is retrieved by the sensor 10, and the information is entered into a memory area of the computer

30 system 9. At this point, the meat is cut into smaller pieces, and each piece is conveyed to selected receptacles of the system. For each selection of a piece of meat to a batch, information is assigned from the data set of the first type to the batch, and the host computer 9 stores in memory data sets which, for each receptacle, represents originations of items included in that receptacle.

35 In Fig. 2, the system is disclosed with the amendment that the separation of the entering items into sub-items is done manually by operators 13, 14, 15. Likewise the system of Fig. 1, the operator receives a piece of meat from an intake 16. At the location of the intake, a sensor 17 transmits a data signal representing the origination of the item, e.g. a farm from which a piece of meat originates, to the host computer

40 18. Further sensors, e.g. a scale for determining the weight of the items, may be

arranged in the intake. The host computer assigns the entering items.to individual process workers or processing stations for manual breakdown or separation of the items. After separation of the items into sub-items (carried out by operators), information concerning the origination is assigned to each of the items in the sub-

5   receptacles 19. The sub-receptacles are emptied onto the main conveyor 20 by activation of releasing means (not shown) controlled by the host computer. On the main conveyor, the position of each item is traced by a sensor 21 before a receptacle is selected for the items and they are discharged from the main conveyor.

10

CLAIMS

1. A method of operating a combined information handling and food processing system wherein items can be conveyed between processing means while a computer system traces its position and preserves information representing its origination while
5   the food is processed, said method comprising the steps of:

- storing a data set of a first type representing origination of an item in memory of a computer system,

- conveying the item to process means for separation of the item into sub-items while the positions of the item and the sub-items are traced by the computer
10   system,

- selecting sub-items for a batch, and

- assigning data from the data set of the first type representing the origination of the item to the batch.

2. A method according to claim 1, further comprising defining a data set of a second
15   type which comprises data from the data set of the first type representing the origination of at least one item and an identifier identifying at least one batch for which at least one sub-item of the at least one item has been selected.

3. A method according to claim 1 or 2, wherein a first type of batches is formed from sub-items of items of a single origination.

20   4. A method according to claim 3, wherein sub-items of items of one origination are selected repeatedly for batches of the first type until a residual amount of sub-items from that origination is insufficient for filling one batch.

5. A method according to any of the preceding claims, wherein a second type of batches is formed from sub-items of items of more than one origination.

25   6. A method according to claims 4 and 5, wherein the residual amount of sub-items is selected for batches of the second type.

7. A method according to any of claims 2-6, wherein the data set of the second type further comprises information relating to the processing of an item or sub-item.

8. A method according to claim 7, wherein the information relating to the processing
30   of the item or sub-item comprises information identifying a processing resource or facility which has been in contact with the item or sub-item.

9. A method according to any of claims 3-8, wherein the selecting of sub-items for a first type of batches is based on a selection criterion wherein sub-items are combined in a batch so that the weight of the batch is within a predetermined range.

10. A method according to any of claims 5-9, wherein the selecting of sub-items for the second type of batches is based on a selection criterion wherein the sub-items are combined in the batch so that the number of different origins of the sub-items is within a predetermined range.

11. A method according to any of the preceding claims, further comprising the step of packaging a batch in a package and assigning data from the first or second set of data to the package to indicate origination of sub-items in that package.

12. A method according to claim 11, further comprising assigning data from the second set of data to the package to indicate processing resources or facilities which have been in contact with sub-items in that package.

13. A combined information handling and food processing system comprising:

   — a conveyer for conveying a food item to process means for separation of the item into sub-items,

   — a computer with memory, the computer being adapted to:

      — store a data set of a first type representing origination of an item in the memory,

      — select sub-items for a batch, and

      — assign data from the data set of the first type representing the origination of the item to the batch.

14. A system according to claim 13, adapted to define a data set of a second type which comprises data from the data set of the first type representing the origination of at least one item and an identifier identifying at least one batch for which at least one sub-item of the at least one item has been selected.

15. A system according to claim 13 or 14, adapted to form a first type of batches from sub-items of items of a single origination.

16. A system according to claim 15, wherein sub-items of items of one origination are selected repeatedly for batches of the first type until a residual amount of sub-items from that origination is insufficient for filling one batch.

17. A system according to any of claims 13-16, adapted to form a second type of batches from sub-items of items of more than one origination.

18. A system according to claims 16 and 17, adapted to select the residual amount of sub-items for batches of the second type.

5   19. A system according to any of claims 14-18, wherein the data set of the second type further comprises information relating to the processing of an item or sub-item.

20. A system according to claim 19, wherein the information relating to the processing of the item or sub-item comprises information identifying a processing resource or facility which has been in contact with the item or sub-item.

10   21. A system according to any of claims 15-20, wherein the selecting of sub-items for a first type of batches is based on a selection criterion wherein sub-items are combined in a batch so that the weight of the batch is within a predetermined range.

22. A system according to any of claims 18-21, wherein the selecting of sub-items for the second type of batches is based on a selection criteria wherein the sub-items are
15   combined in the batch so that the number of different origins of the sub-items is within a predetermined range.

23. A system according to any of claims 13-22, further comprising packing equipment for packaging a batch in a package and for assigning data from the first or second set of data to the package to indicate origination of sub-items in that package.

20   24. A system according to any of claims 13-23, further comprising a set of electronic tags and means for transferring data between the computer and the tags, the system being adapted to receive information from one primary tag and transfer the data to a number of secondary tags, said number corresponding to the number of sub-items arising from the separation of the food item.

25   25. A system according to claim 24, further comprising a meat item separation device which is controlled by the computer to separate the food items into the number of sub items.

7 0 5 9   2 8. 11. 03

ABSTRACT

The invention relates to an apparatus for processing food wherein food items are conveyed through processing stations where they are cut into pieces and optionally mixed with items originating differently. In particular, the invention relates to a system wherein information related to each food item and the positions of the food items throughout the processing are traced so that the origination of a food item is preserved.
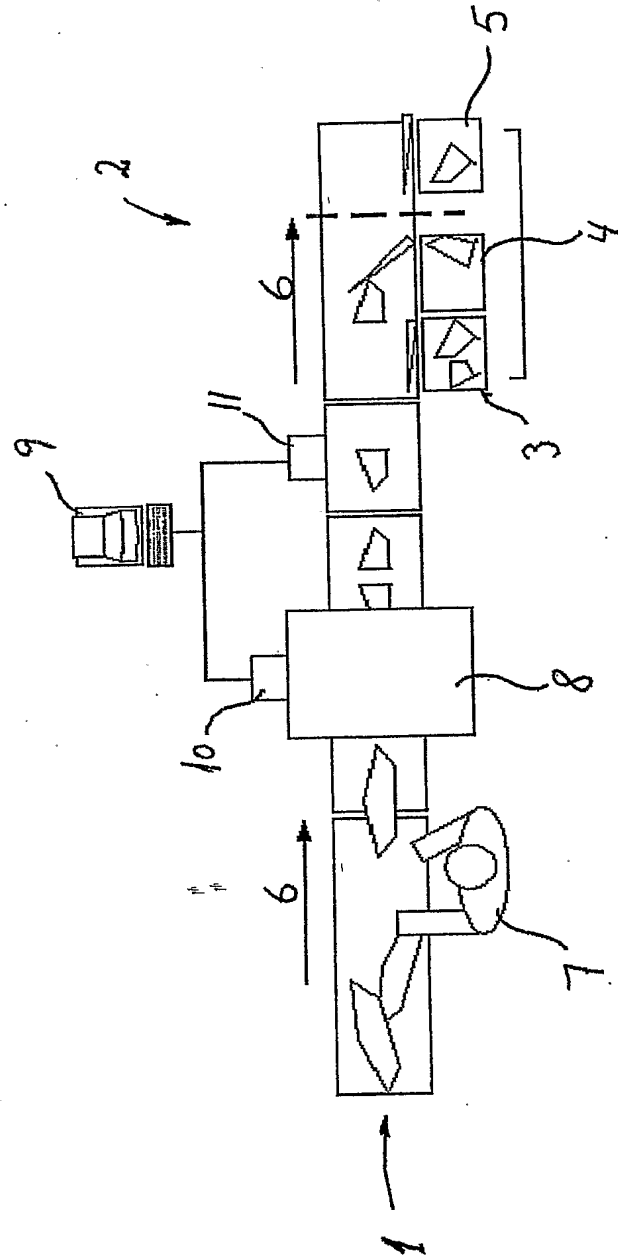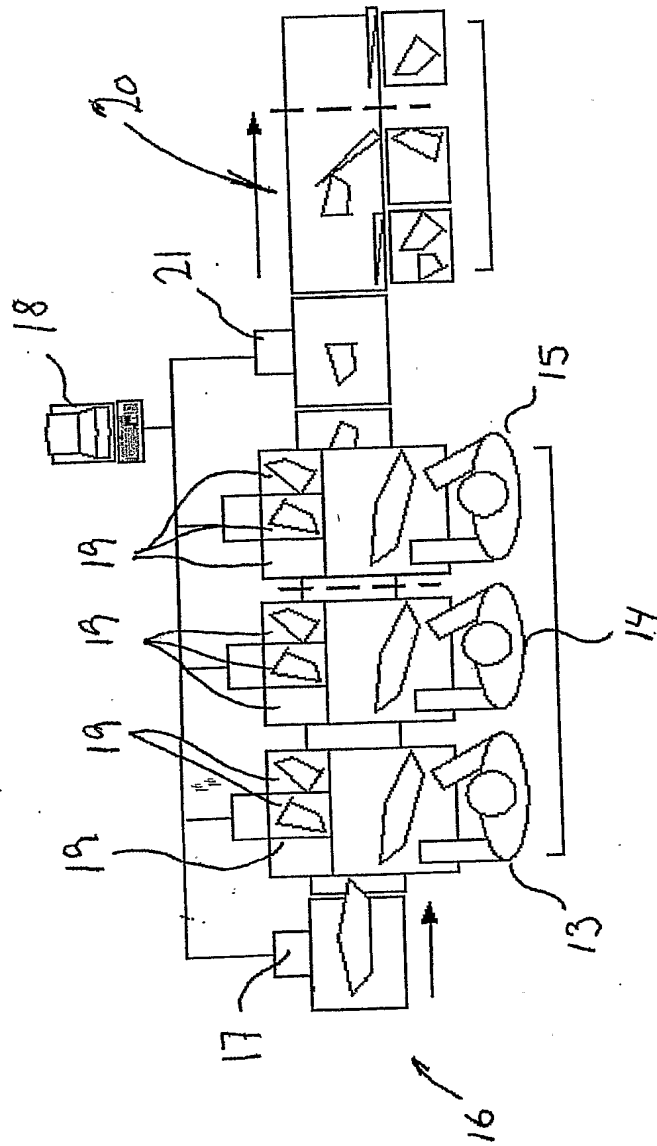
Fig. 1

7 0 5 9   2 8. 11. 03

Fig. 2